

## ***Telenomus oryzae* (Hymenoptera: Platygasteridae), a new egg parasitoid of the rice black bug, *Scotinophara* (Heteroptera: Pentatomidae) from India**

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### **Abstract**

*Telenomus oryzae* (Hymenoptera: Platygasteridae), an egg parasitoid of the rice black bug on rice from India is described as new to science. The species has a wide distribution in the rice fields of the South Indian State of Kerala. Illustrations of *T. oryzae* sp. nov. are provided and its affinities with other species are discussed. *T. cyrus* Nixon, the closely related species, is redescribed based on the holotype and paratypes. A key to species of *podisi* group of *Telenomus* of Oriental Region, the group parasitizing the eggs of pentatomid and scutellerid bugs is also appended.

**Keywords:** *Telenomus*, India, rice black bug, egg parasitoid, new species.

### **Introduction**

*Telenomus* spp. attacking the eggs of Pentatomidae and Scutelleridae (Heteroptera), belong to 'podisi' species group (Johnson, 1984). In Oriental Region, only two species of *Telenomus*: *T. triptus* Nixon, 1937 and *T. cyrus* Nixon, 1937 (Johnson, 1984) are known to attack the pentatomid eggs.

The Rice black bug is a highly invasive pentatomid heteropteran, attacking various growth stages of the rice plant and has now a significant status as a potential pest of rice in many countries, including India (Narayansamy, 2007). Ambikadevi (1988) had reported the incidence of *Scotinophara bispinosa* at Kuttanad rice fields of Kerala in Alappuzha, one of the study areas of the present work. On a global scale, of the 6 species of egg parasitoids reported from the eggs of the rice black bugs, 3 species belong

to *Telenomus*: *T. triptus* Nixon, *T. chloropus* (Thomson, 1860) and *T. gifuensis* Ashmead, 1937 (Polaszek and Rajmohana Kumar, 2007). Here we report a new species, *Telenomus oryzae* as an egg parasitoid of the rice black bug on rice from Kerala and Tamilnadu.

### **Materials and Methods**

This work is a part of the ongoing studies (Rajmohana and Narendran, 2007 and Rajmohana, 2010) on the systematics of Telenominae (Hymenoptera: Platygastroidea) of India.

Morphological terminology follows Masner (1979) and Johnson (1984). Male genitalia slides were prepared as per Polaszek and Kimani (1990). The notes on holotype and paratypes of *T. cyrus* are excerpts from the studies (unpublished) on

Nixon's types of Telenominae made by the first author, in 2007, during a study visit to BMNH, London.

The description and imaging was conducted using Leica M205A stereomicroscope and Leica DFC-500 digital camera. The SEM images were procured with Jeol JCM-5000 NeoScope Benchtop SEM, using specimens coated with gold.

All the material studied is deposited in National Zoological Collection, of Zoological Survey of India, Calicut.

*Abbreviations and Terminology:* A1-A11: Antennal segments 1 to 11; T1-T4: Metasomal tergites 1 to 4; L: Length; W: Width; DCI: Dorsal Cephalic Index (ratio of width to length of head measured dorsally); LOL: Lateral ocellar length; POL: Posterior ocellar length; BMNH: British Museum of Natural History, London; NZC: National Zoological Collection; ZSIC: Zoological Survey of India, Calicut, Kerala.

## Systematics

### *Telenomus oryzae* sp. nov.

(Figs. 1 -9)

*Material examined:* Holotype; ♀ (Reg. No. ZSI/WGRC/T8) INDIA: Kerala: Edathara (24 km from Alappuzha) Alappuzha (9.43527 N, 76.421667 E), 12.viii.2008, emerged from *Scotinophara* eggs on rice, coll. M.S. Nisha.

Paratypes; 24 (Reg. No. ZSI/WGRC/T9-33) 3♀ and 1♂ with same data as that of the holotype; 5♀ and 1♂ INDIA: Kerala: Wayanad: Madakkimala (11.39651 N, 76.05318 E) (paddy field), 19.xii.2008 and 1♀ on 9.i.2009 from the same locality; 2♀ INDIA: Kerala: Malappuram: Nilambur; Kavalamukkatta (11.15132 N, 76.21174 E) (paddy field), 16.ix.2008 and 1♀ same locality, 30.ix.2008; 3♀ INDIA: Kerala: Calicut: Peruvayal (11.15178 N, 75.54237 E)

(paddy field), 2.i.2009, 2♀ and 1♂ on 11.xii.2008 same locality, coll. K. Rajmohana. 4♀ INDIA: Tamilnadu: Neikuppam (12.78 N and 79.8183 E) (paddy field), 14.xii.2010, malaise trap coll. S. Divya.

## Description

*Holotype:* Female; body length 0.9-1.01 mm. Head and body black; all coxae yellow; rest of legs also yellow; terminal tarsal segments and claws brownish black; radicle, antennal scape and pedicel ventrally yellow; pedicel dorsally and rest of antenna brownish black; eyes and ocelli silvery; wings hyaline, veins brown.

Head (L:W = 18:39); distinctly transverse; DCI = 2.16; vertex and occiput with fine coriaceous reticulate sculpture, steeply angled down to occiput; hyperoccipital carina seen as a trace beneath lateral ocelli, not continuous medially; occipital carina interrupted medially; occiput between hyperoccipital and occipital carina with same coriaceous sculpture as that on vertex; frons anterior to median ocellus smooth, but with a faint patch of coriaceous sculpture at median part above toruli; ocellar setae 1 pair, widely separated; orbital band wide and extending throughout, not interrupted medially; frontal pit present; frontal depression indicated; frons bulging between antennal insertions and inner orbits (best visible when viewed from above); ratio of frons width to eye height = 1.06; eyes with very fine sparse setae; inner orbits angled at level of lateral ocelli; lateral ocelli contiguous with orbital margin, connected by a wide sulcus posteriorly; post ocellar groove behind lateral ocelli distinct; grooves not meeting medially; LOL:POL = 8:15; malar space smooth, sulcus distinct; temples not bulging, hardly visible in dorsal view; gena and temples smooth except for narrow coriaceous band along posterior orbits, extending towards occiput; antenna 11

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segmented in females; radicle small, less than A2 2x as long as wide, A3 (first funicular segment) elongate, 2.5x as long as wide and distinctly longer than pedicel; length of A3 > length of A2 (1.13x) and A3 length > A4 length (1.5x), A4 length 1.2x length of A5; A5 and A6 subequal; A7-10 quadrate; length of A2:A3:A4:A5 = 23: 26:17:14.

Mesosoma (L:W= 36:33), not as wide as head dorsally (0.83x); mesoscutum convex, with rough scaly reticulations; sculpture finer posteriorly towards scuto-scutellar sulcus; sulcus foveolate and wider laterally; finely crenulate medially; humeral as well as supra humeral sulcus foveolate; mesoscutellum smooth, with dense long setae; metascutellum punctate reticulate, longest medially and overlapping propodeum; acetabular carina simple; episternal fovea absent; intercoxal space greater than length of forecoxa; netrion feebly indicated; mesopleural furrow well developed; mesopleural carina absent; metapleural carina notched, well developed only in posterior half; forewing at rest surpassing apex of metasoma; basal vein not pigmented; postmarginal vein much longer than stigmal; hindwing at its widest point 1.8x length of marginal fringe; forewing L:W= 26:9.

Metasoma (L:W= 35:25); T1 with 2 pairs of sublateral and 3-4 pairs of lateral setae; greatest length of basal costae on T2 about 2x median length of T1, with fine wrinkles extending even beyond; relative proportions of length of T1 and T2 being 2:15.

Male; body length 0.9 mm. Identical to female, differing only in normal secondary sexual characters. A3 and A4 of antenna elongate; A3 1.7x as long as wide; A4 1.83x as long as wide and longer than all segments other than scape.

Male genitalia; aedeagal lobe medially drawn, tapered and truncate towards tip; laminae volsellares sclerotised; aedeago-

one-third length of scape; clava 5 segmented; volsellar shaft concave lateromedially; digitus small, digiti 4.

*Host:* Emerged from eggs of *Scotinophara* spp. (Heteroptera: Pentatomidae).

*Etymology:* The species is named '*oryzae*' after the host plant (paddy) of the host bugs.

### *Telenomus cyrus* Nixon, 1937

Length 1.26 mm; head and body black; coxae blackish brown, rest of legs yellowish brown; antenna uniformly dark in colour, blackish brown, scape a bit paler; wings hyaline. DCI = 2.09; vertex rounded to occiput, thought slightly angled in lateral view; coriaceous throughout, with scattered superimposed setigerous punctures; post ocellar groove distinct; hyperoccipital carina present as a trace, not complete medially; occiput coriaceous near vertex; occipital carina not complete medially; orbital bands wide and not interrupted near mid-point of eyes; frons otherwise smooth; ocellar seta present; frontal depression distinct, frons bulging between antennal insertions and inner orbits; eyes with sparse fine setae; inner orbit feebly angled at level of lateral ocelli; ratio of frons width to eye height (measured in front view) = 1.04; malar space coriaceous, temples not bulging; coriaceous sculpture along posterior orbits extending halfway distance to occipital carina; temples hardly visible in dorsal view; antenna with 11 segments, A3 elongate, distinctly longer than A2 (8:7) and A4; A5 and A6 nearly subequal; clava 5 segmented, claval segments not transverse.

Mesoscutum length and width nearly subequal; convex, coriaceous; scutellum smooth, setose, metascutellum punctate-reticulate throughout, longest medially, slight overlapping propodeum (visible in lateral view); acetabular carina simple; episternal foveae absent; width of intercoxal space less



than length of forecoxa; mesopleural carina absent; mesopleural furrow feebly developed; posterodorsal corner of metapleuron not expanded; metapleural carina distinct; forewing surpassing tip of metasoma; marginal fringe short, hindwing at widest point 2.5x length of marginal fringe at that point.

Metasoma 1.35x as long as wide. T1 with 2 sublateral and 3 pairs of lateral setae; greatest length of basal costae on T2, more than (nearly twice), medial length of T1.

### Discussion

The species of *Telenomus* from China (Wu *et al.*, 1979 and Wu and Chen (1980 and 1985) were reared from eggs of Lepidoptera and hence do not belong to *podisi* group. As mentioned by Johnson (1996) in world revision of *Paratelenomus* Dodd, the characters mentioned in the descriptions of the Vietnamese species (Le, 1993 and 2000) are of little value in the diagnosis of the species. However, as per the original figures, the Vietnamese species *Telenomus lubitus* Le, 1993, described from *Scotinophara lurida*, the aedeagal lobe of the male genitalia is not medially drawn as that in *T. oryzae* sp. nov.

*Telenomus oryzae* sp. nov. keys to *T. cyrus* (couplet no. 2 and couplet no. 16) in the key to Asiatic species of *Telenomus* by Nixon (1937 and 1940), however, does not fully comply with the description of *T. cyrus*. In the key to egg parasitoids of *Scotinophara* spp. by Polaszek and Kumar (2007), the new species keys to couplet 5, but does not fit either to *T. chloropus* (in legs being yellow and not black, proportion of basal antennal segments also differing) or to *T. cyrus*.

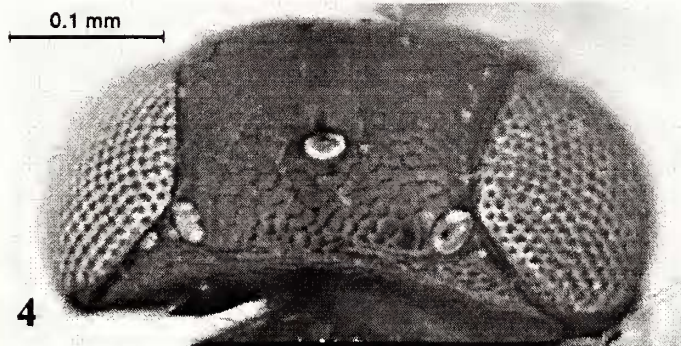
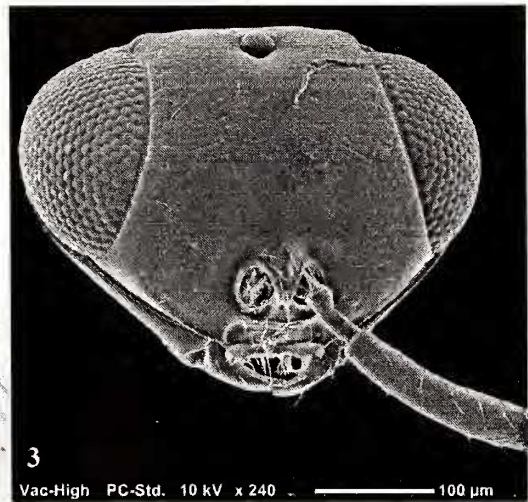
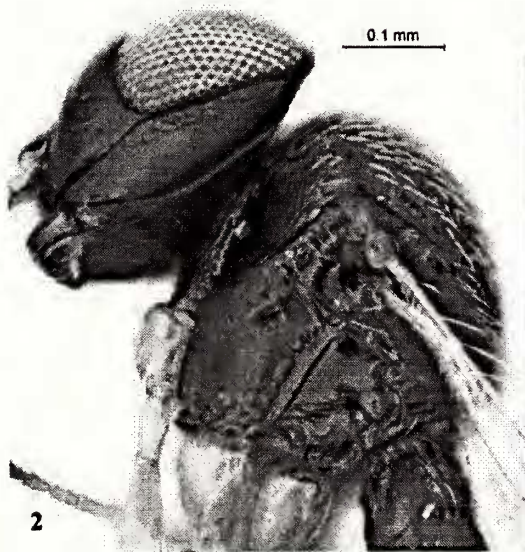
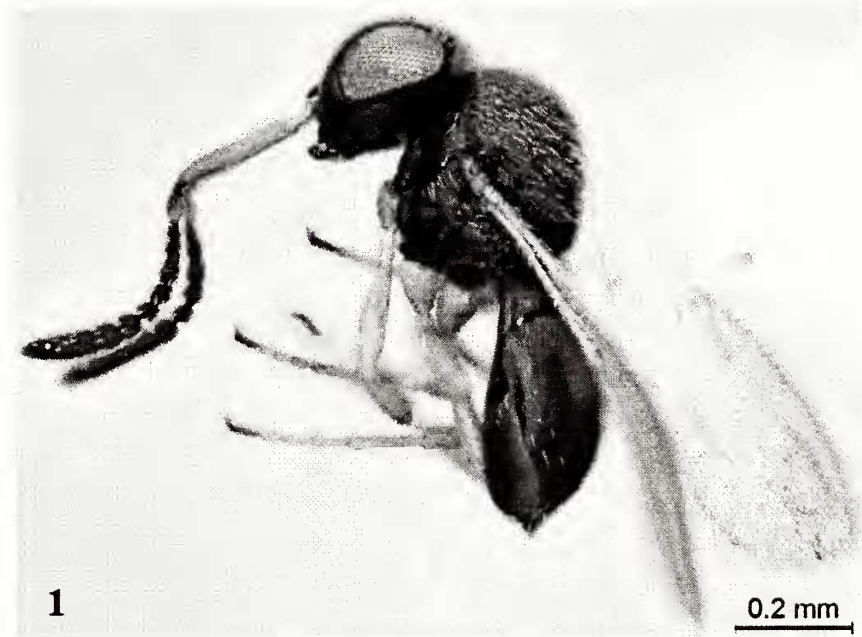
The combination of characters differentiates *T. oryzae* sp. nov. from *T. cyrus*: *T. oryzae* has yellow coxae; antenna is bicoloured, with entire scape and pedicel in

part yellow, rest of antenna brownish black; antennal segments A5 and A6 are subequal; metasoma is only 1.35x as long as wide while in *T. cyrus* coxae are fully dark, almost black; antenna is unicolorous, dark brown or black throughout; antennal segment A5 longer than A6; metasoma is 1.5x as long as wide. Hindwing at its greatest width is less than 2x length of marginal fringe at that point in *T. oryzae*, while the same ratio is more than 2.5x in *T. cyrus*.

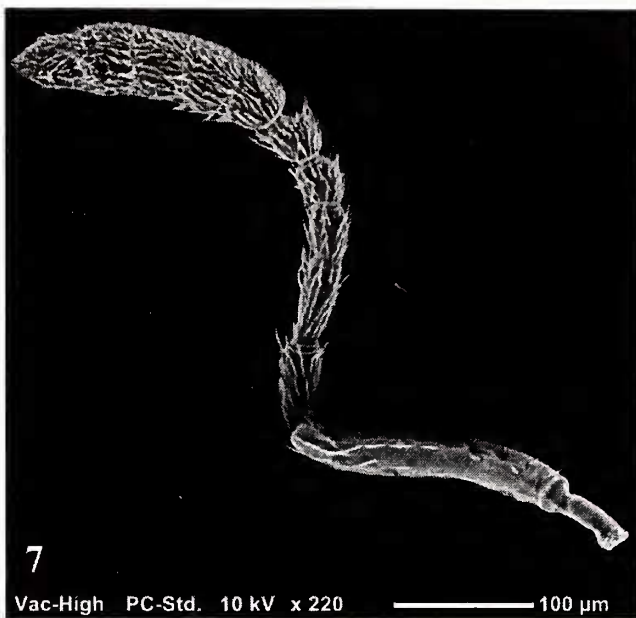
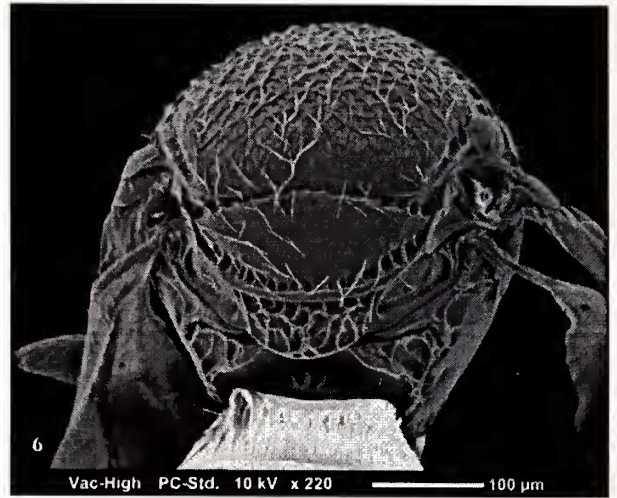
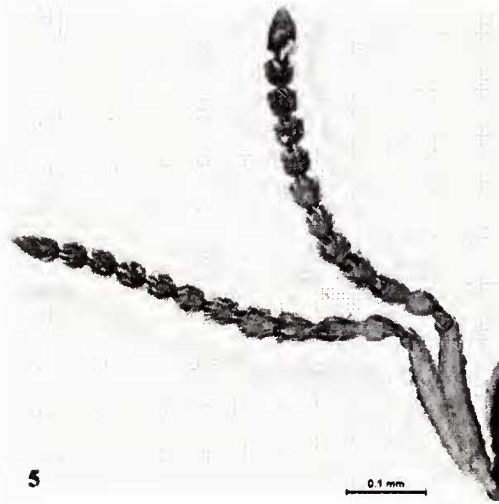
With the aedeagal lobe of male genitalia medially drawn and tapered, the central projection is much prominent, thus the genitalia structure of *T. oryzae* is different from that of *T. cyrus* or *T. triptus*, where central projection is not prominent. The male genitalia of *T. cyrus* resembles that of *T. triptus* as in Nixon (1940) and Polaszek and Rajmohana (2007).

The following combination of characters serve as a diagnosis for *T. oryzae* sp. nov.: body robust and black; all coxae yellow, both male and female antenna bicoloured, with scape and ventral A1 yellow and rest dark brown to black; in females A3 elongate, distinctly longer than A2 and A4; A5 and A6 subequal; orbital band with coriaceous sculpture uninterrupted, hyper occipital carina present only as a trace laterally, vertex deeply angled to occiput, post ocellar furrows present, scaly reticulate sculpture on median mesoscutum fading towards scutoscuteellar sulcus, scutellum smooth and shiny with long dense setae, metascutellum punctate reticulate, longest medially and overlapping propodeum; hindwing at its greatest width less than 2x length of marginal fringe at that point; T1 with 2 sublateral setae; T2 with longitudinal striae on its basal one-third, male genitalia with a medially tapering and truncate aedeagal lobe, length of tapered part being less than length of digiti.

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Figs. 1-4: *Telenomus oryzae* sp. nov. (1) Body, lateral view; (2) Head and Mesosoma, lateral view; (3) Head, full-face view; (4) Head, dorsal view.



**Figs. 5-8: *Telenomus oryzae* sp. nov. (5) Male antenna; (6) Mesosoma, dorsal view; (7) Female antenna; (8) Male genitalia.**



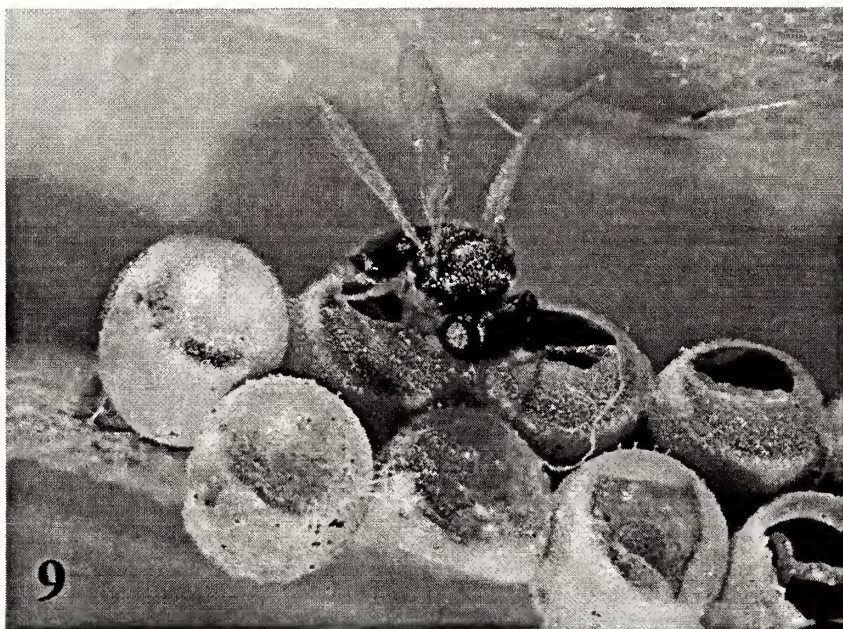


Fig. 9: *Telenomus oryzae* sp. nov. emerging from eggs of *Scotinophara* sp.

**Key to 'podisi' species group of *Telenomus* from Oriental Region**

1. A3 of female antenna shorter than pedicel and  $< 2x$  as long as wide .....*T. triptus* Nixon
- A3 longer than pedicel and  $> 2x$  as long as wide.....2
2. All coxae yellow; hindwing at its greatest width less than  $2x$  length of marginal fringe at that point.....*T. oryzae* sp. nov.
- All coxae black; hindwing at its greatest width  $> 2.5x$  length of marginal fringe at that point.....*T. cyrus* Nixon

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**References**

- Ambikadevi, D. 1998. Occurrence of rice black bug, *Scotinophara bispinosa* in Kuttanad, Kerala. *Insect Environment* 4(3): 80.
- Ashmead, W.H. 1904. Descriptions of new Hymenoptera from Japan -- I. *Journal of the New York Entomological Society* 12: 65-84.
- Johnson, N.F. 1984. Systematics of Nearctic *Telenomus*: classification and revisions of the *podisi* and *phymatae* species groups (Hymenoptera: Scelionidae). *Ohio Biological Survey Bulletin* 6(3): 1-11.
- Johnson, N.F. 1996. Revision of world species of *Paratelenomus* (Hymenoptera: Scelionidae). *The Canadian Entomologist* 128: 273-291.
- Lê X.H. 1993. Khóa phân loại ong ký sinh giông *Telenomus* Haliday, 1833 (Hymenoptera, Scelionidae) ở Việt Nam (phân giông *Telenomus*). *Tap Chi Sinh Hoc* 15(2): 1-8.
- Lê X.H. 2000. Egg-parasites of family Scelionidae (Hymenoptera). *Fauna of Vietnam*, vol.

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3. Hanoi: Science and Technics Publishing House 386 pp.
- Narayanasamy, P. 2007. Status Report on Rice Black Bug Situation in India. *In*: R.C. Joshi, A.T. Barrion and L.S. Sebastian (eds.). Rice black bugs: taxonomy, ecology, and management of invasive species. Science City of Muñoz, Nueva Ecija: Philippine Rice Research Institute 525-537pp.
- Nixon, G.E.J. 1937. New Asiatic Telenominae (Hym., Proctotrupoidea). *Annals and Magazine of Natural History* (10) 20: 113-127.
- Nixon, G.E.J. 1940. New species of Proctotrupoidea. *Annals and Magazine of Natural History* (11)6: 497-512.
- Polaszek, A. and Kimani, S.W. 1990. *Telenomus* species (Hymenoptera: Scelionidae) attacking eggs of pyralid pests (Lepidoptera) in Africa: a review and guide to identification. *Bulletin of Entomological Research* 80: 57-71.
- Polaszek, A. and Rajmohana K. 2007. Taxonomy of the Egg Parasitoids of Rice Black Bug, *Scotinophara* spp. *In*: R.C. Joshi, A.T. Barrion and L.S. Sebastian (eds.). Rice black bugs: taxonomy, ecology, and management of invasive species. Science City of Muñoz, Nueva Ecija: Philippine Rice Research Institute 351-360pp.
- Rajmohana K. and Talukdar S., 2010. A new species of *Psix* Kozlov & Lê (Hymenoptera: Platygasteridae) from India. *Biosystematica* 4(2): 57-62.
- Rajmohana, K. and Narendran, T. C. 2007. A new species of *Paratelenomus* (Hymenoptera: Scelionidae) from India. *Zoos' Print Journal* 22(1): 2522-2523.
- Thomson, C.G. 1860. *Sverges Proctotruper*. Tribus IX. Telenomini. Tribus X. Dryinini. Öfversigt af Kongliga. Vetenskaps-Akadamiens Förhandlingar 17: 169-181.
- Wu, Y.R., Chen, T.L., Liao, T.S. and He, J.H. 1979. Descriptions of six new species of *Telenomus* (Hymenoptera: Scelionidae). *Acta Zootaxonomica Sinica* 4(4): 392-398.
- Wu, Y.R. and Chen, T.L. 1980. A study on Chinese *Telenomus* (*Aholcus*) (Hymenoptera: Scelionidae). *Acta Zootaxonomica Sinica* 5(1): 79-84.
- Wu, Y.R. and Chen T.L. 1985. Five new species of *Telenomus* from China (Hymenoptera: Scelionidae). *Sinozoologia* 3: 147-152.